connecting and disconnecting the grid power source (**10**) to the at least one fuel cell power plant (**18**) and to the critical load (**14**);

d. a switch controller (**49, 45**) for controlling the state of the static switch (**19**) to connect the grid power source (**10**) with the critical load (**14**) and the at least one fuel cell power plant (**18**) during normal operation of the grid power source (**10**) and to disconnect, within less than an 8.3 millisecond interval, the grid power source (**10**) from the critical load (**14**) and the at least one fuel cell power plant (**18**) when the grid power source deviates beyond a limit from normal; and

e. a site management controller (**31**) connected with the switch controller (**49, 45**) and the power conditioning system (**PCS**) and responsive to the switch controller (49, 45) for providing mode control signals (**D1/401', D2/402'**) to the fuel cell power conditioning system (**PCS**) to cause the at least one fuel cell power plant (**18**) to rapidly transition operation, within less than an 8.3 millisecond interval, between the grid connected mode and the grid independent mode.

11. The power system (**8**) of claim **10** wherein the at least one fuel cell power plant (**18**) is caused to rapidly transition operation between the grid connected mode and the grid independent mode in an interval of less than about 4 milliseconds.

REMARKS

Claims 1-9 were pending in the application and were under rejection by Office Action dated April 11, 2002. The Specification is amended above at page 17, by rewriting to replace the paragraph extending from line 16 to line 33 to correct an error in

line 28, to wit, "G/C' is changed to "G/I". A marked copy of that paragraph showing the change therein is contained on a separate sheet submitted herewith. Independent claim 9 has been amended by rewriting in clean form above to correct a misspelling in line 11, to wit, "call" is changed to "cell". A marked copy of claim 9 showing the change therein is contained on a separate sheet submitted herewith. Moreover, new independent claim 10 and new dependent claim 11 have been added hereto above to further define the invention. New claim 10 differs from claim 9 in that it no longer recites "preliminary mode signals" and it changes (broadens) the switching/mode-change intervals to "less than about 8.3 milliseconds". New claim 11 differs from claim 9 in the former of those two changes in claim 10. The same may be said with respect to claims 6 and 7 (and 8). Claims 1 – 11 are now pending in the application.

Claims 1-6 have been rejected under 35 USC 102 (e) as being anticipated by Cratty 6,288,456. Claims 7-9 have been rejected under 35 USC 103 (a) as being obvious in view of Cratty. Applicants respectfully traverse the propriety/applicability of such rejections with respect to the invention as claimed.

Applicants wish to reiterate the comments of the Background Art on pages 1-5 of the present application in which several different types of systems employing uninterruptible power supplies (UPS) were described and their respective shortcomings/limitations noted. Most specifically, applicants wish to call attention to the discussion beginning at page 3, line 12 and continuing to page 5, line 11. That discussion is of PCT application US99/10833, which is the exact PCT counterpart of the Cratty Patent 6,288,456 applied as the reference herein. Applicants discussion of that Cratty PCT application emphasized that it required an intermediate, the motor-generator 230 and the flywheel power source 216, to provide the "uninterruptability" required for critical loads that can not tolerate "interruptions" greater than about 8 milliseconds. Applicant's discussion makes note, at page 4, lines 12-19, of the characteristic of prior art fuel cell systems to require that they "interrupt power generation for up to 5 seconds" in order to switch from a grid connected (GC) mode of operation to the grid independent (GI) mode, and vice versa. Indeed, the Cratty patent mentions that characteristic at Column 5, lines 8-14 and lines 47-49. Thus, for Cratty to obtain the "uninterruptibility" required to assure "continuous" power to critical loads such that interruptions are no greater than 8.3 milliseconds, it is necessary to rely on the rotary inertia of the motor/generator 230 and the power source 216 containing the flywheel 152. As was further noted in the present application, the requirement of such hardware contributes to cost and complexity, and its avoidance is an object of the invention.

With respect to the present invention, one or more fuel cell power plants 18 serve as the primary source of electrical power to critical load 14, as indicated by claim language referring to it being "normally, substantially continuously connected and providing power to, the critical load 14" (Cl 1, L 8-10; Cl 9, L7, 14-16; and Cl 10, L7 and 14-16). Moreover, that role of the fuel cell power plants 18 as the primary source of power is reinforced by the recitation in the claims that the switch 19 selectively connects and disconnects the first (or grid) power source to the second (or fuel cell plant 18) power source and to the critical load 14 (Cl 1, L 11-14; Cl 9, L 17-20; and Cl 10, L 17-20). Moreover, the claims require a switch controller 49/45 that controls the state of the static switch to rapidly disconnect and/or reconnect the grid with both the fuel cell(s) and the critical loads when operation of the grid departs from, or returns to, normal (Cl 1, L 15-

23; Cl 9; L 21-29; Cl 10, L 21-30). Briefly stated, the present invention provides for a fuel cell to normally, substantially continuously be connected to and provide power to, a critical load, and for grid power to be rapidly connected with or disconnected from the fuel cell and critical load and the grid disconnection/reconnection and the mode changes of the fuel cell to occur sufficiently fast (all in less than about 8 milliseconds) that an intermediate UPS is not required to still allow substantially uninterrupted power to the critical loads.

In the foregoing analysis, it is seen that the fuel cell is normally the primary source of power and is thus normally, continuously connected to the loads, the grid is selectively disconnected from and/or reconnected to, the fuel cell and load, and a static switch and associated controller rapidly accomplish such disconnection/reconnection of the grid as a function of the abnormality/normalcy of grid operation. Importantly, the system is one for providing "uninterrupted power to a critical load" (Cl 1, L 1&2; Cl 9, L 1&2; Cl 10, L 1&2), and in the rapid manner discussed in the preceding paragraph, yet without any requirement for a supplemental UPS such as required by the prior art, including Cratty.

The Examiner has rejected claims 1 and 6 as being anticipated by Cratty, and briefly recites four elements from Cratty as being full equivalents of the four elements (a., b., c., and d.) of claim1, and presumably also the additional elements and functions of claim 6. On the one hand, applicants acknowledge that Cratty contains the four elements recited by the Examiner, but Applicants respectfully traverse the Examiner's application of those four elements as being full equivalents of the structure and function recited in claims 1 and 6.

Applicants require their fuel cell power source to be normally, substantially continuously connected and providing power to the critical loads, yet Cratty discloses fuel cells 102 being connected to the critical loads only via the intermediate use of rotary energy storage devices. The Examiner recites Cratty as having "a static switch for selectively connecting and disconnecting the first power source to the second power source and to the critical load". For that to be a full equivalent of applicant's element c. in claim 1, it must refer to a static (solid state) switch in Cratty that is connecting/disconnecting Cratty's grid 111 to the fuel cell 102 and the critical loads. Applicants presume the Examiner is relying on Cratty's transfer switch 128 as that switch. However, it is not immediately evident that that particular switch serves to disconnect/connect the grid 111 to the fuel cell 102 and loads while the fuel cell is remaining "normally, substantially continuously connected" to the loads. What action at the transfer switch 128 accomplishes this result, i. e., disconnects grid but not fuel cell from load? Or is it, instead, the thyristor 172? But if the latter, what is the controller for controlling it? And if the thyristor 172, why does Craty say at Col 4, L67 to Col 5, L 3 that power (from fuel cell 102) will not flow directly to loads (albeit via motor generator) through AC input 1 until the thyrstor 172 shuts off? Apparently power from the fuel cell must pass through the switch to get to the motor/generator for the load, which is certainly not the case for the claimed present invention. Moreover, regarding Applicant's element d., the Examiner states that a switch controller for controlling the static switch is an inherent part of Cratty's power system. Perhaps it is, but Applicants have difficulty finding disclosure in Cratty of such a controller or, more importantly, of such a control

mode in which the fuel cell remains connected to the loads and the transfer switch is caused to disconnect/reconnect the grid.

Indeed, such purported applicability becomes even less likely with respect to claim 6 which further requires a power conditioning system (PCS) for configuring operation of the fuel cell in response to mode control signals, and a "site management controller connected intermediate the switch controller and the PCS and responsive to preliminary mode signals *from the switch controller* (emphasis added) for providing the mode control signals". The claim thus recites two controllers, a switch controller and the "site management controller" that responds to preliminary mode signals from the switch controller. To find this in Cratty, one must identify two controllers, one of which controls the transfer switch 128 and the other of which receives preliminary mode signals from the first controller and in turn provides mode control signals to a PCS for the fuel cell. The presence of such structure and function is not evident to Applicants, and has certainly not been identified by the Examiner with the brief statement that it is an "inherent part of the power system".

Referring to the rejection of claims 7-9 for obviousness in view of Cratty, Applicants must respectfully traverse such rejection. Firstly, Applicants do not believe that the disclosure and teaching of Cratty renders claims 1-6 obvious, for the various reasons previously given. Claim 7, which depends from and contains all of the limitations of claim 6, further requires that the rapid disconnection of the grid from the fuel cell and the critical loads, and the rapid transitioning of operation of the fuel cell between grid connect and grid independent modes occurs within an interval of about 4 milliseconds. The Examiner justifies this rejection by saying that Cratty discloses a power system wherein the rapid transitioning of operation of the fuel cell between modes can tolerate no more than 8.3 ms. Applicants respectfully submit that such is not an accurate characterization of Cratty. Rather, Cratty discloses that its various critical loads can not tolerate a power interruption interval longer than 8.3 ms, and that because the fuel cells 102 normally require up to 5 seconds to reconfigure (Col 5, L 8-15 and 47-49), it is necessary to have the rotary inertia power generating devices intermediate the power sources (fuel cell and/or grid) and the critical loads. In fact, that teaching of Cratty is contrary to and the need-stimulus for, the presently claimed invention. Applicants can rapidly disconnect/reconnect the grid with the fuel cell and critical loads, as well as rapidly perform the mode changes in the operation of the fuel cell PCS's, in each instance in as little as about 4 milliseconds. It is this capability that negates the need for the expensive rotary UPS equipment that is essential for Cratty, and that forms the basis for Cratty's claim of invention. Clearly Cratty has no applicability to the limitations of claim 7. Claim 8, which depends directly from claim 1, introduces the provision that the grid is disconnected from the critical loads and fuel cell within an interval of about 4 milliseconds. Nowhere does Cratty specifically disclose or suggest that such occurs, and indeed, the reliance upon intermediate rotary UPS equipment to "ride through" the "lengthy" ("up to 5 seconds") delays during fuel cell mode changes, serves to de-emphasize need for or reliance on a rapid disconnection/reconnection of the grid. Claim 9 essentially includes the limitations of claims 1, 6 and 7 expressed in independent form and using some modified language in the preamble and further specifying "within a 4 millisecond interval" switching speed for the grid disconnect and separately also the same

speed for the site management controller's mode control signals to effect mode change of the fuel cell power plant PCS.

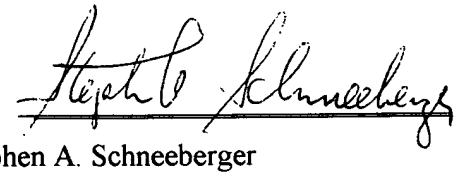
In view of the foregoing comments, Applicants believe they have convincingly demonstrated the patentable novelty and unobviousness of the invention as set forth in claims 1-9. Claim 10 and 11 have been added to cast the novel aspects in a slightly different manner than the claims previously in the application, as described at the beginning of these REMARKS. However, claim 10 is similar in many respects to claim 7, and the use of an 8.3 millisecond interval is essentially as "unobvious" vis a vis "up to 5 seconds" as is the 4 millisecond interval. In each instance, Applicants are able to meet the computer industry's need for "substantially uninterrupted" power, without relying on the UPS required by Cratty and the prior art.

Although new independent claim 10 and dependent claim 11 have been added, the claim-count of independent claims and total claims remains within the initial filing fee, and no additional fee should be required, In the event a further fee is required, authorization is hereby given to charge Deposit Account No. 50-1307.

Accordingly, favorable reconsideration and an indication of allowance of all of the claims herein are respectfully solicited. In the event the Examiner feels there are remaining issues which might be resolved by telephone, he is respectfully requested to contact Applicant's attorney at telephone : (860) 313-4402.

Respectfully submitted,

Douglas Gibbons Young, et al

By: 

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Specifically, M2 rapidly transitions to "On", while M1 remains "Off" for the brief interval required for switch **19** to transition from "On" to "Off". The discrete signals D1 and D2 have the same states as M1 and M2, respectively. The transition of signal M2 (and thus D2) to the "On" state serves to briefly turn "Off" the inverter gates in the **PCS**s such that, for a brief interval less than 4 ms, the **PCS**s of the fuel cells **18** do not provide an electrical power output while they are being reconfigured to the G/I mode of operation. During this interval, the **PCS** output regulators are being reconfigured, such that in the G/C mode they regulate power (real) and VARs and in the [C/C] G/I mode they regulate voltage and frequency. The sync is also being reconfigured during this interval. This interruption is sufficiently brief and the switch **19** sufficiently fast, that there is little or no chance for an overload on grid **10** to adversely impact the remainder of power system **8**.

9. (amended) A power system (**8**) for providing substantially continuous electric power to at least a critical load (**14**), comprising:

a. a utility grid power source (**10**) providing sufficient power to supply the critical load (**14**);

b. at least one fuel cell power plant (**18**) operating substantially continuously for providing at least sufficient power to supply the critical load (**14**), the at least one fuel cell power plant (**18**) including a power conditioning system (**PCS**) for configuring operation of the respective fuel [call] cell (**18**) in a grid connected mode or in a grid independent mode in response to mode control signals (**D1/401', D2/402'**), the at least one fuel cell power plant (**18**) being normally substantially continuously connected and providing power to, the critical load (**14**);

c. a static switch (**19**) for selectively connecting and disconnecting the grid power source (**10**) to the at least one fuel cell power plant (**18**) and to the critical load (**14**);

d. a switch controller (**49, 45**) for controlling the state of the static switch (**19**) to connect the grid power source (**10**) with the critical load (**14**) and the at least one fuel cell power plant (**18**) during normal operation of the grid power source (**10**) and to disconnect, within a 4 millisecond interval, the grid power source (**10**) from the critical load (**14**) and the at least one fuel cell power plant (**18**) when the grid power source deviates beyond a limit from normal; and

e. a site management controller (**31**) connected

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between the switch controller (**49, 45**) and the power conditioning system (**PCS**) and responsive to preliminary mode signals (**M1/401, M2/402**) from the switch controller (**49, 45**) for providing the mode control signals (**D1/401', D2/402'**) to the fuel cell power conditioning system (**PCS**) to cause the at least one fuel cell power plant (**18**) to rapidly transition operation, within a 4 millisecond interval, between the grid connected mode and the grid independent mode.